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THE RHODE ISLAND MEDICAL JOURNAL



Owned and Published by the Rhode Island Medical Society. Issued Monthly

VOLUME XVII
No. 6

Whole No. 297

PROVIDENCE, R. I., JUNE, 1934

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Loose Stools in Infants

require extra diapering, and inconvenience the mother

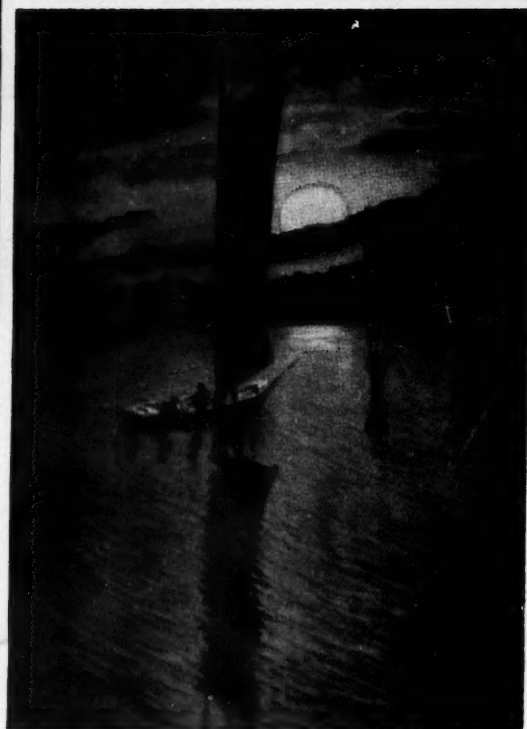
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ORIGINAL ARTICLES

PULMONARY CARCINOMA*

Illustrated by two cases autopsied at the
Homeopathic Hospital of Rhode Island
(Lanternslides)

By CONSTANT E. SCHRADIECK, M.D.

Pathologist

65 HAZARD AVENUE, PROVIDENCE, R. I.

*Mr. President, Members of the Society,
and Guests:*

The topic of this paper is two cases of pulmonary carcinoma, one of primary and one of metastatic origin, on which I performed the autopsies at the Homeopathic Hospital of Rhode Island in 1931 and 1933 respectively. It is a pleasure gratefully to acknowledge the help given to me by Dr. Clarke of the Rhode Island Hospital, who made lanternslides from my sections, and by Dr. Hunt of the Homeopathic Hospital, who made lantern-slides from the X-ray findings and the gross specimens. The case of primary carcinoma of the lung I will present first.

The patient, a 53 years old married lady, was admitted to the Homeopathic Hospital June 30, 1931. Family history: One brother died of tuberculosis, otherwise non-essential. Nine years ago she had her uterus and ovaries removed; nothing malignant was seen then. At this time her complaint is coughing and pain in the left side of the chest. She says that she has lost weight and looks somewhat emaciated. The respiratory excursions of the chest are equal but shallow. The breath-sounds are increased at the apices. No rales were heard. Heart action regular, rate about 90 the minute. No murmurs were heard. Blood-pressure 130/78. The examination of the abdomen showed no tumors, no tenderness, no distension.

The thoracic pain is really the chief complaint of the patient and remained it. At times it could be relieved but always recurred, ranging in intensity from a dull pressure to sharp exacerbations, and it

generally increased toward the end. She coughed, but raised little sputum which on one day only appeared streaked with blood. That day it contained cylindric epithelial cells. Expectoration was not a prominent feature, her cough being rather unproductive. Examinations for tubercle bacilli were negative. About the beginning of September the patient refused food more and more and, rapidly declining, she became increasingly uncomfortable, occasionally nauseated and grew progressively weaker. On account of the steadily increasing thoracic pain the last X-ray film was taken in her bed. The temperature remained quite steadily between 100 and 101. With increasing weakness and emaciation she passed away September 27.

Discussing the pathology of the case, let us first look up the X-ray findings. Four such studies were made, but it will suffice to show the first film, which was taken upon admission, and the last one, taken 10 days before the end. (Demonstration.) The very first film showed a quite definitely outlined ovoid shadow in the right upper thorax and also a more diffuse density in the left upper pulmonary field. Both of these shadows increased in size, as the subsequent examinations showed, and also a number of smaller outlying nodular shadows came gradually into view, scattered about the periphery of the larger ones. The autopsy was held September 29, 1931. Somewhat condensed, the gross findings were as follows: The heart was found small, hypoplastic. It weighed only 180 grams and showed no localized valvular disease. The upper lobes of both lungs are extensively adherent to the costal pleurae. Both upper lobes are the seat of large globular masses of what appears grossly as neoplastic tissue. This appears medium-firm on palpation and consists of a doughy grayish to yellowish and pink tissue flecked with small areas of hemorrhage here and there. The consistency is slightly firmer than that of gray hepatization. Each of these masses located within the upper lobes is about the size of a small orange. Another rounded mass of similar appearance was seen within the upper part of the left lower lobe. This is of about one-half the size of the others. The tissue as viewed and palpated grossly is distinctly not pulmonary tissue. Grossly

*Read before the Rhode Island Medical Society on December 7th, 1933.

it has no clearly outlined structure and within the center has undergone degenerative changes resulting in a sort of crumbly tissue debris. These masses of degenerating, presumably carcinomatous, tissue are surrounded by compressed and congested pulmonary tissue. Limited areas of the degenerated neoplastic tissue are undergoing autolytic liquefaction. The presence of several smaller and well and also below the pleural and within the lower lobes are apparently local tumor-metastases. The trachea and the main bronchi below the bifurcation showed no gross pathology. The larger bronchi were cut open posteriorly as far as possible. The upper bronchial branches seemed to end within the tumor-masses occupying the upper lobes. Before such fusion with the tumor-masses the bronchial lumina were not found invaded with papillary projections. Only a slight nodular thickening could be seen here and there. (Dem.)

We will proceed to the analysis of the histological texture of the tumor, its manner of growth and metastases, with the help of some of our slides. Langhans contended that many of the bronchial cancers—and practically all of the primary pulmonary cancers—are supposed to be bronchiogenic, originate within the bronchial glands. These occur throughout the bronchial tree, where they lie below the muscularis mucosae, as far as the cartilage is found within the bronchial wall. Cartilage occurs until the bronchial lumina have reached a diameter of about one mm. Histologically they are mixed glands, muco-serous glands, showing both mucoid and albuminous cells. The latter stain deeper and cap the mucoid cells as demilunes. These do not secrete mucus and, according to Maximow, are not convertible into mucoid cells. In our slides (Dem. of slides 3, 4, 5) these bronchial glands appear tumefied, and one gains the impression that the tumor actually starts in them, in as much as they show both intact glandular acini and also cylindrical and pleomorphic tumor-cells and the tumor-formation occurs within the structural limitation of these glands. From here they could spread by way of the ducts of these glands to the bronchial lumen and by way of the lymphatics to the bronchial mucosa which they infiltrate and tumefy. They also would grow within the peribronchial lymphatics and from here could invade the adjacent pulmonary alveoli. Thus, wherever that occurs, a focus of tumor-tissue is established which will grow by its own proliferation expansively. (Slide 5.) Once the pulmonary alveoli are invaded, it will invest

these and will grow both by further invasion of them and of the lymphatics of the alveolar ducts thus infiltrating the pulmonary stroma until a sizable tumor is formed (slide 6) which on the lymphway will metastasize to the peribronchial and mediastinal lymphnodes (slides 7, 8, 9) and also invading venous and arterial vessel-walls, as we can see in some of our slides (Dem. of slide 10), will metastasize further on the bloodway, either setting up a metastasis in some distant part of the lung if an arterial branch is invaded, or by reaching the systemic circulation setting up a peripheral metastasis, say, e. g., in some part of the skeleton, if a pulmonary vein is invaded. The tissue of the main-tumors as well as that of outlying nodular metastases in the pulmonary tissue and also (slide 9) the tumor-tissue which has invaded the parabronchial and the mediastinal lymph-nodes metastatically shows essentially the same structure and is made up of rather large cylindrical and polyedral cells of a somewhat pleomorphic character. In one or more layers the tumor-cells either invest the walls of preformed spaces, as f. i., of lymphatic vessels or of pulmonary alveoli, or, if they fill these spaces more solidly, they can be seen trying to form acini even within the bounds of a more solid alveolar growth. With reference to its histological classification the tumor should, therefore, be classed as an adenocarcinoma. (Slides 11-15.) In addition to what has been said about the autopsy-findings, it is to be noted that metastases were also found within the bodies of the sixth and fifth thoracic vertebra. No further metastases were noted except, as stated, within the peribronchial nodes. The abdominal organs were all examined. Spleen and liver were found atrophic and of subnormal size. There was a general enteroptosis. Uterus and adnexa had been removed eight years ago. The cervical stump was inspected. No evidence of tumor-tissue was seen in the abdominal organs. There were no metastases in the liver.

In the complete absence, then, of any other tumor in the body which could be considered primary, and judging by the gross and the microscopical appearances, as set forth, we will have to designate our case as an adenocarcinoma of the lung, primarily originating there either from the mucoid glands of the bronchial wall, or from the bronchial surface-epithelium or both and growing bilaterally.

Sporadic records of the gross lesions of primary carcinoma of the lung date back from the beginning to the middle of the last century. Jaccoud in Paris

distinguished it first clearly from phthisis. The earliest microscopical studies were published about the early seventies of the last century. Since then the literature has considerably increased and at this time comprises probably well over 600 cases. The disease prevails in the male sex, showing the highest incidence between the fourth and the fifth decades of life. In a series of 106 cases Perrutz located 35% in the left and 54% in the right lung, while 10% were bilateral.

Talking about etiology, all one can do is to separate the cases from the clinical observation and the post-mortem examination, of which no further definite findings are available for the discussion of a possible causal connection from those with such findings on record. A certain group of cases belong to the first class. In these the disease develops apparently in previously normal parenchyma. Another and prevailing number, however, shows other conditions associated with the disease which permit of the discussion of etiology.

Chronic irritation is recorded as an etiological factor in connection with primary pulmonary carcinoma. That, in itself, is quite in keeping with that same cause of carcinoma elsewhere in the body. That such irritation will, of necessity, cause the perversion of orderly restrained normal tissue-growth regeneration into frank neoplastic cell-autonomy—that of course is not inferred by this statement. Quality, intensity, dosis and duration of such irritation will have much to do with that, just as intensity, dosage and duration of the actinic rays or the X-ray may incite various modifications of tissue-reaction in organs or body-surfaces exposed to these agencies. If, however, inflammatory tissue-reaction associated with alterations in the stroma exists for a considerable length of time leading to obstruction of lymphatic drainage and to changes in tissue-tension, so that local toxic damage of a certain order acts persistently upon a limited area of epithelial membranes or other parenchyma: then the cellular complexes exposed to such damage may become anaplastic, and their normal functional stimuli being overshadowed by the abnormal chronic irritation, the organic differentiation of the cells is no longer sustained by functional ends. The energy of their altered metabolism then manifests itself as autonomous growth either altogether without any functional relationship, i. e., purely neoplastic or with quantitatively or qualitatively distorted function associated with more or less ana-

plastic newgrowth, as, f. i., in certain tumors of the endocrine glands.

Writing in his treatise on neoplastic diseases about primary carcinoma of the lungs, Ewing states that tuberculosis is the chief cause. Other authors, as Oertel and Boyd, make less of that point and regard it more as a coincidence. Nevertheless it might as well be emphasized here that there are numerous instances of various types of neoplastic disease on record which were found associated with frank tuberculosis. That happens, f. i., occasionally in the Fallopian Tube. Here tuberculosis is sometimes associated with a marked hyperplasia of the tubal mucosa-epithelium which may pass into frank carcinoma. Ewing mentions that combination and I recall to have seen such a case myself. Again: Cases of lupus vulgaris of the skin often show a marked heterotopic down-growth of the epidermis which at times may become anaplastic and then pass into the state of lupus-carcinoma, a condition developing as well in the active lesions of lupus as in the scar-tissue of these lesions and taking the form of adult tubular acanthoma with marked tendency to metastasize. Another instance is Hodgkins disease. The connection of this lymphoblastoma with tuberculosis and its passing from the initial state of granuloma to that of a highly destructive malignant anaplastic lymphoma is much discussed. Ricker's case (quoted by Ewing) of association of active tuberculosis with a widely metastasizing and rapidly growing lymphosarcoma I witnessed myself as a medical student in the Pathological Institute of the University of Rostock. Instances of this type could be enlarged upon. The irritation associated with tuberculosis apparently leads occasionally to ektodermal or mesenchymal anaplasia resulting into autonomous neoplastic growth. In our case tuberculous lesions were present and appear in the slide, and another case is hence established of the coexistence of tuberculosis with carcinoma primary in the lung.

That chronic infections other than tuberculosis may be considered in that connection appears also from a number of cases on record. Also chemical irritation figures as a causative factor. Ever since about the year 1500 it was known that a considerable number of the workers in the cobalt mines of Schneeberg in Saxony died of some lung disease characterized by cough, dyspnoea, loss of weight, pain in the chest and mucopurulent or hemorrhagic sputum. Investing a series of these cases over a period of several years, Schmorl found in 21 of

them carcinoma of the lung fifteen times, that is, in 71% of his cases. He believed that the injury to the lungs leading to cancer was wrought by gaseous combinations freed from the arsenic containing ores by mould fungi. The experimental work carried out with coal-tar on animals (either by intratracheal insufflation or by tarring the skin of mice and observing among other lesions pulmonary carcinoma caused presumably by systemic resorption of that irritant) is another case in point. In this connection it may also be recalled that chronic irritation of another kind was employed in experimental cancer work on rats by Fiebigler, who produced gastric cancer with pulmonary metastases in these rodents by infesting them with a nematode-parasite symbiotic in cock-roaches, the tumor-tissue developing eventually about the bodies and the ova of the parasites thus implanted in these feeding-experiments into the gastric mucosa. More recently Bullock and Curtis have produced malignant and widely metastasizing tumors, partly of mesenchymal origin and partly of cancerous nature, by feeding the ova of another parasite, the *taenia crassicolis*, to rats. This parasite is often found to infest the intestine of the house-cat. Fed to rats the ova of these *taeniae* are carried as larvae from the gastric and intestinal mucosa of the infested animals to the liver by way of the portal circulation and the cystic stage of the parasite develops within the liver-tissue. After several months of latent growth the toxic irritation caused by the presence of these cysts produces an inflammatory tissue-reaction which, in a certain percentage of the cases, leads to true neoplastic anaplasia and to various forms of malignant tumors which may metastasize widely and can also be transplanted to other animals of the same species.

Primary pulmonary carcinoma is apparently increasing. It is disputed as to whether the cause of that might be the increasing gross contamination of the atmosphere in our industrial centers or of habitual inhalation of irritating dust from disintegrating road-material, as asphalt and tar products, crude oil and others, or of a combination of these agencies acting upon chronic inflammatory pulmonary lesions of infectious origin. Whatever the cause may be, it is apparently on the increase due to some such causes and not simply because more cases are investigated and properly diagnosed than in former years, though that might contribute to a certain extent, more elaborate and complete records now being available of the disease.

With reference to the origin of the carcinoma within the lung three possible sources are generally considered, namely: the bronchial surface epithelium, the epithelium of the bronchial mucous glands and the alveolar epithelium of the pulmonary parenchyma. Only in less extensive tumors which come to observation at a comparatively early stage the question as to origin can be settled with some degree of certainty. Tumors arising either from the bronchial glands or the bronchial surface-epithelium infiltrate the submucosa of the bronchial wall. Occasionally they form papillary projections into the bronchial lumen which can be visualized with the bronchoscope and may lead to stenosis and occlusion causing formation of bronchiectatic cavities, areas of pneumonic infiltration, pulmonary abscess, cavitation with or without hemorrhage. The tumors arising from this source are sometimes of the squamous and sometimes of the cylindercell-variety. The tumors which arise from the bronchial glands are said often to show much mucoid degeneration, but other varieties of cylindercell-adenocarcinoma may also arise from this source. The grossly so called nodular forms which may occur bilaterally and may infiltrate extensive areas of the pulmonary parenchyma, may arise promiscuously from the alveolar epithelium and that of the smaller bronchi. Again, there occur more rarely quite diffuse forms of primary pulmonary cancer which infiltrate the whole lung and, on the post-mortem table, look very much like a diffuse lobar pneumonia in the stage of gray hepatization, of decidedly firmer consistency, however, on palpation. I remember well to have seen such a case in 1925 which came to autopsy at the Rhode Island Hospital. (Dem. of slides.)

Microscopically one sees in pulmonary cancers a considerable variety of cells: the squamous type, the cuboidal cell type, the more fully differentiated cylindrical cell type, further flattened cell types approaching spindle-form, the so called oat-grain cell type, and also more irregular polyhedral and round cell types of anaplastic appearance.

Within the lung the tumor-tissue spreads by lymphatic extension involving by orthograde extension the bronchial and mediastinal lymphnodes. That happened in our case. At times retrograde spreading along the lymphatics may also occur and then the tumor may reach the pleura and, spreading there, may, by continuity, even infiltrate the thoracic cage. Again, it may spread by invading the smaller pulmonary arterioles and the capillary sys-

tem of the lung and hence reach the systemic circulation by means of the pulmonary veins. That, too, has happened in our case and in some of the sections tumor-tissue can be seen within cross-sections of smaller pulmonary veins. That explains the peripheral invasion of other organs which, in our case, appears to have been limited to the skeleton. A defect caused by tumor-metastasis was seen in one of the vertebrae as mentioned in the autopsy-record. As to whether the bilateral occurrence of the tumor was simultaneous, i. e., multicentric, or whether tumor-material was aspirated from lung to lung and grew out again by implantation from the bronchial mucosa, that is difficult to decide. Transmission of tumor-tissue by aspiration to other distant parts of the respiratory tract is considered a quite possible mode of spread by some authors, whereas others, among them Ewing, doubt it. In two of our slides tumor-tissue was seen within bronchial lumina. In one of them it had replaced the mucosa and had formed a perfect lining of the bronchial wall; in another a cast of well staining tumor-cells filled the lumen of a bronchus, the wall of which was still invested by original bronchial epithelium. Morphologically these tumor-cells showed no degeneration and appeared capable of becoming the matrix of a secondary implant.

The second case which is before us today has the following record: The patient, a 62 years old white man, complained of pain in the left hip and knee, of about seven weeks duration. Previously he felt perfectly well and gives no history of an injury. He owned an ice-truck, thought that he had caught a cold. No history of traumatic strain. He went to several physicians and also received osteopathic treatment. The treatment consisted in medication, strapping and manipulation. Lastly he was seen by an orthopedic surgeon who suggested an X-ray examination, which was done in the X-ray Department of the Homeopathic Hospital of Rhode Island. The films showed destruction of the left transverse process of the third lumbar vertebra. (Dem. of slide 17.) A chest film showed a circular area of increased density in the right lung, overlying the third rib anteriorly. Based upon the study of these films the diagnosis of malignant disease of the right chest with metastases to the lumbar spine was made. The shadow in the right lung was rather sharply outlined, of rounded contour and appeared some distance away from the hilum. The prostate was examined and was found normal and, no other evidence of a primary tumor being found, the con-

dition was classed as a primary carcinoma of the right lung.

After his admission he continued to complain about pain in the left hip. He had a persistent cough, practically without expectoration. The patient made little of that symptom himself, called it a "cigarette-cough." He had no symptoms of gastro-intestinal disease. On admission he appeared distinctly cachectic; this appeared in keeping with the pulmonary lesion. His general condition became rapidly worse, especially so since January 1. He was bright, communicative and co-operative until then, but about that time became quite irrational. He was held under opiates most of the time and he expired January 7.

The autopsy was held January 7, 1933. Without going into all of the detail I will give a summary of the findings.

The lungs were not adherent and there was no excess of free fluid in the pleuric cavities. The main area of tumor-tissue was found in the location indicated by the X-ray films near the base of the right upper lobe. It is of roughly spherical outline, about the size of a large chestnut. On the cut-surface the tissue is firm, partly of a grayish-white color and partly darker, flecked with deposits of anthracotic pigment. Two bronchi pass close to the area. These could be followed in their course and the tumor originated apparently not from them, as far as could be seen grossly. Rather close to the mass of the main-tumor and nearer to the hilum of the lung an enlarged anthracotic parabrachial lymphnode was seen. On the cut surface this appeared extensively infiltrated with tumor-tissue. It was about the size of a cherry. Several smaller paratracheal lymphnodes higher up were also found to contain tumor-metastases. Areas of bronchopneumonic infiltration were scattered through both lower lobes. Small and firm shotty nodules were felt rather widely scattered below the pleuric surfaces as well as within the lung-tissue itself. These also showed tumor-infiltration microscopically. Grossly on account of their small size and lack of color distinction they could easily be overlooked. In the left side of the chest the sixth rib showed a fusiform swelling near its posterior angle. The bone was here extensively destroyed, the rib could be cut with the knife, it was thoroughly infiltrated with tumor-tissue. A similar condition obtains also in the 2. and 3. left ribs, from where the tumor-tissue could also be traced subpleurally into the tissues of the chest-wall.

The abdomen showed no excess of free peritoneal fluid. Fat-tissue very atrophic. Ileum- and jejunum-coils almost empty, not inflated; they occupy only a small space. The stomach (Dem. of slide 19) shows on its anterior surface in the region of the fundus an area of subserous tumor-infiltration, about one inch below the cardia. The stomach wall appears here infiltrated and is about $\frac{3}{4}$ cm. thick. This area, upon opening the viscus, is seen to correspond to a large ulcerated neoplasm, evidently a carcinoma, of circular outline, in diameter about 6 cm., surrounded by a thickened craterous wall of neoplastic tissue, the center of the lesion broken down and showing a floor of necrotic tissue. The remainder of the stomach and the duodenal mucosa show no further lesions. The mucosa of the jejunum and the ileum shows nothing remarkable except at one spot in the ileum, about five feet upward from the ileo-cecal junction. Here the serosa opposite the mesenteric attachment shows a firm grayish-white tumor-infiltration covering an area of ovoid outline, the long diameter of the oval running transverse to the axis of the intestine. This area measures 2 by $1\frac{1}{4}$ cm. Upon opening this part of the ileum it was seen that a superficially ulcerated area with slightly raised edges corresponds to the outline of the lesion. The mesenteries show a number of small lymphatic metastases. One larger one was removed from the mesentery of the upper jejunum. Microscopically it was found to be crowded with carcinoma-tissue. A number of smaller tumor-infiltrated lymphnodes were seen along the course of the abdominal aorta and about the pancreas. The third lumbar vertebra was involved and on the left side its transverse process was destroyed. There was extensive bone-resorption and the body of that vertebra could be cut with the knife. Gall-bladder and biliary passages were found free and patent. The liver is not enlarged. Upon its superior and inferior surfaces both in the right and left lobe several small metastases were seen. These were, however, strictly limited to the surface of the organ and none were found within the deeper liver-tissue. Along the lumbar vertebra which was found the seat of metastatic tumor the substance of the left psoas-muscle was found riddled with extensive tumor-metastases. The colonic mucosa showed a number of small diverticula, partially filled with inspissated feces. Otherwise no gross lesions were seen in the colon and none in the

rectum. The bladder showed nothing of note; the prostate was grossly and microscopically normal. The kidneys are of small size and show their structure well outlined grossly. The left kidney differs from the right in the presence of a number of small tumor-deposits, all in the periphery of the cortex and assuming the form of small multiple tumor-infarcts. Only one, a very small one, was seen in the right kidney. The pancreas shows grossly nothing of note. Clinically, also, intracranial metastases were suspected, but the cranial cavity was not explored. (Dem. of slides 20-33.)

This case presents some interesting features. Firstly: It was diagnosed clinically as another case of primary pulmonary carcinoma, and secondly, from the point of clinical history. The chief complaint centered in low back-pain and pain in the left knee. That is why the patient was first sent in for X-ray examination by the orthopedic surgeon and also was examined urologically. As far as pulmonary symptoms are concerned, there were not many. The patient had a dry, hacking cough, but he paid not much attention to that. When asked about it, after the X-ray of the chest was taken, he half laughed it off, thinking it rather insignificant—"a cigarette-cough," he said. Another remarkable feature is that a cancer of the stomach could exist and reach the size as found at autopsy, without any gastric symptoms marked enough to call attention to that particular lesion. It is true, his anorexia and cachectic habitus would have caused this possibility to be investigated, but the neoplasm in the chest being known, in the X-ray film, so closely portraying that of a primary lesion and also the lumbar discomfort readily referable to the spinal metastasis,—these symptoms called really for no further explanation. Another peculiar feature of our second case is that all the metastases in the liver were of nearly uniform size. All of them were small, probably of nearly the same age and apparently of more recent origin. They were widely scattered and were all found strictly upon the surface of the organ situated just below Glisson's capsule. Serial sections through the liver-tissue itself showed none at all in the interior of the organ. The picture, hence, was quite different from that often seen in stomach-cancer, where the liver throughout its substance is riddled with large and small nodular metastases, and it raises the question whether these superficial liver-metastases originated not so much by invasion of the portal venous circulation as perhaps rather suddenly by way of the hepatic artery. A tumor

embolus, then, passing peripherally through the main arterial current, could have been split up, some of it going through the celiac axis into the hepatic artery, causing the superficial, widely scattered peripheral liver-metastases; again, some of it entering one of the mesenteric arteries may have carried the metastatic tumor-matrix into the wall of the ileum, which we pointed out grossly and microscopically as the seat of a metastasis, and lastly, some of it entering into one or both of the renal arteries could have set up the metastases in the cortex of the kidneys.

We were fortunate to visualize the invasion of a gastric vein by the tumor in one of our sections directly, and, considering that the primary cancer in the stomach was located quite close to the cardia and, also, that there are notoriously anastomoses between the gastric veins in that location and the oesophageal veins, which drain off into the azygos vein, we can say that tumor-material leaving the stomach lesion via the gastric veins could very well have reached the right lung on the bloodway more directly and earlier than that would have happened by way of the thoracic duct, and set up a metastasis in that organ at a comparatively early date. We also saw in one of our slides the invasion of a small pulmonary arterial vessel by the tumor-tissue. The same thing, probably, happened to pulmonary veins and from there, of course, the systemic arterial circulation is open to any invasion, as was pointed out before. Unfortunately, the cranial cavity could not be explored. We might have found metastases there, too, judging by the clinical windup of the case. Aside of that, metastases occurred on the lymphway freely, as evidenced by many tumor-invaded mesenteric, retroperitoneal and mediastinal lymphnodes. That the pulmonary metastasis appeared rather large and formed a well outlined tumor in itself may be due to the fact that it occurred rather early, so that it could grow into a tumor so closely simulating a primary carcinoma of the right lung radiologically.

And, that the cancer of the stomach was not more outspoken in its local symptoms, that is likely due to its location high in the fundus along the anterior wall, thus approaching the so called silent area of stomach-carcinoma. Notably cancers located in the fundus near the greater curvature may exist for a long time without marked symptoms.

GAS BACILLUS INFECTION — A REPORT OF TWO CASES*

By JONAH FIELDMAN, M.D.†

CHARLES V. CHAPIN HOSPITAL, PROVIDENCE, R. I.

Gas gangrene, although of rare occurrence in civil life, does occur with sufficient frequency to merit discussion. Because of its relative frequency as a complicating factor of wounds received during the late war, the disease has received an increasing amount of attention.

The condition was first described by Maison-neuve in 1853 under the name of gangrene foudroyante. It has been variously labelled—gas gangrene, acute mortification, war gangrene, fulminating gangrene, emphysematous gangrene, and traumatic spreading gangrene.

It is difficult to obtain reliable figures concerning the incidence of this disease, but data compiled during the World War indicate that 1 to 3% of infected wounds presented the picture of gas gangrene. Statistics show that weather has an effect upon its occurrence, having been observed more frequently during the cold and wet months. Butler reported two cases of gas infection of the abdominal wall in 7,000 laparotomies. Weintrop and Meseloff made a study of 85 cases of gas gangrene occurring at the Bellevue Hospital and found that it occurred once in every 7,310 cases.

The disease is caused by a variety of anaerobes, the chief offender being the bacillus aerogenes capsulatus, also called the bacillus Welchii. The organisms found associated with the latter are: (1) the vibron septique, (2) bacillus oedematiens and (3) bacillus sporogenes. These are all capable of breaking down carbohydrates and protein with the production of hydrogen and carbon dioxide. The bacillus sporogene produces the sulfide gas which gives to this condition the characteristic putrid odor. Many workers who have studied this condition argue that the organism has no effect on living tissue, i.e., there must co-exist certain attending factors. Some of these are: (1) a defective blood supply to the injured area and (2) death of the tissue either by direct trauma—the actual severance of the blood supply or thrombosis of the vessels to the part. Among other causes may be included inefficient splinting with injury to the blood supply.

*From the Surgical Service of the Brockton Hospital.

†Fieldman—Interne at the Surgical Service of the Brockton Hospital.

constriction of the limb by the use of tourniquets and the damming back of discharges by tightly packing the wound. It would seem then that there are essentially three factors necessary to produce this disease: (1) trauma with a breach in the integrity of the skin, (2) contamination with material in which the offending anaerobes live, such as earth, soil, fecal matter, manure, etc., and (3) death of tissue. All seem to agree upon the fact that the death of the tissue is a necessary antecedent to the spread of the disease. By far the greatest percentage of cases are seen in extensive and deep lacerations of muscle tissue and in compound fractures of the long bones.

The pathology can readily be observed in the diseased muscle by the usual staining methods with eosin and hematoxylin. It consists essentially of a liquefaction and coagulation necrosis of muscle. Grossly, it is readily noted that the tissue is "dead." One is unable to identify individual muscle bundles which now are almost black in color and jelly-like in consistency. A thin greenish pus permeates the diseased tissues and is probably due to a superimposed infection with pyogenic organisms. The latter being aerobic (streptococci and staphylococci), add to the severity of the disease by utilizing the available oxygen.

Microscopically the diseased muscle fibre stains uniformly with eosin and one is unable to identify the individual fibrils. The former are swollen and separated from the interstitial connective tissue. Later on, the sarcolemmal nuclei undergo pyknosis, karyolysis and finally, do not take the stain at all. In transverse section, the organisms can be found far beyond the edge of the gangrenous area.

The organism which is almost always found by direct smear is a gram positive rod with rounded or sometimes square-cut ends. Spores are usually absent in the tissues but are often found in the culture. They are enclosed in a transparent capsule. Growth is rapid at 37° C., and in the usual culture media containing certain sugars (nutrient agar with dextrose) there is produced much gas. Cultures are made in accordance with any of the anaerobic methods. There is some question as to whether or not a specific exotoxin is produced by the organism.

All suspicious wounds and lacerations with definite injury of tissue especially muscle and all compound fractures particularly those of the long

bones, should be watched and examined for gas bacillus infection. In the ordinary "clean" case the patient is treated, returned to the ward, and when seen the next day, presents the facies of a comparatively comfortable individual. However, in such cases, with a superimposed gas infection, acute constitutional symptoms with a local production of gas may be present within a few hours following the injury. A patient left in good condition may be found in extremis in a few hours. The early symptoms are pain in the affected part, a feeling of malaise and restlessness, a rise in temperature with an increase in the pulse rate. Vomiting may be an early symptom and later on may become particularly persistent and disturbing. One of the earliest physical signs is swelling of the affected limb; locally, the skin is pale, tense and cold. The area immediately around the wound is crepitant. This may be heard by placing the stethoscope over the affected part. Later on, the overlying skin becomes discolored and mottled with purple patches which is indicative of interference with the blood supply and death of the underlying muscle. Finally, the skin takes on a greenish yellow hue. The diagnosis can readily be made by observing the above mentioned symptoms and may be confirmed by examination of the direct smear or by the demonstration of gas in the stab culture. A positive blood culture is rarely present and can only be seen very late in the disease.

CASE 1. M. V. is that of a white Italian male, age 47. The patient was admitted through the accident floor following a fall. A diagnosis of a compound supracondylar fracture of the right humerus was apparent. There was a history of contamination with the soil. The patient was given the usual emergency care and a temporary splint was applied. Within 24 hours there was a marked rise in temperature, from 98° on admission to 102.4° within several hours. There was some swelling and tenderness of the right upper arm. The temperature fluctuated from 100° to 102°. The patient continued to run a temperature and appeared sick. Seven days following admission he was taken to the operating room where multiple incisions with drainage of the right arm were performed. A smear taken at this time revealed infection with the bacillus aerogenes capsulatus. A stab culture showed the production of gas. The above-mentioned objective findings were also present in typi-

cal form. On the following day, it was deemed wise to make further incisions both above and below the right elbow anteriorly and posteriorly. A polyvalent gas gangrene antitoxin was given daily as will be mentioned below. The incisions were made in the fascial planes and split by blunt dissection to avoid an undue amount of bleeding. No packs or drains were inserted. The wound was irrigated with hydrogen peroxide and chlorazane. No dressings were applied and the arm was placed on a clean sheet beneath a cradle from which was suspended an electric bulb. The patient continued to run a septic temperature and there were obvious signs of absorption. A blood culture was not done. It was apparent that if nothing was done to prevent absorption the patient would die either from a toxemia or a septicemia. Consequently a guillotine amputation was done twenty-two days following admission. The site of the operation was about twelve centimeters below the shoulder. The stump was left exposed to the air and covered as directed above by a cradle and drop lamp. The polyvalent antitoxin, of which 21 bottles were given, were discontinued at this time. Two days following the operation the temperature became essentially flat and the patient's condition became correspondingly more hopeful. Since then (up to the time of writing) the temperature has continued to be normal and patient is well on the road to recovery. The site of amputation appears healthy and is granulating in well over the bony stump. It should be remarked that tetanus antitoxin was given on admission.

CASE 2. G. J., age nine years, white, male, entered the accident room following an injury while riding on the back of his father's truck. There was a longitudinal laceration on the lateral aspect of the left lower leg with transverse section of the gastrocnemius and soleus muscles. Antitetanic serum was given. The wound was irrigated, debrided and an anatomical repair of the muscle was done. The skin was closed around rubber drains 28 hours after admission it was noticed that the injured member had become discolored, painful and swollen. The sutures were removed and a smear taken and stained by the gram method showed the gas bacillus. An anaerobic culture made from the same material showed the production of gas. It was apparent at this time that the patient was very sick, showing signs of profound toxemia. With the pa-

tient under nitrous oxide and oxygen anaesthesia, the leg was opened up, the muscle bellies split by blunt dissection and the necrotic tissue was removed. A full therapeutic dose of a polyvalent gangrene antitoxin was given with no apparent improvement. The patient was in extremis and amputation was considered as the only possible life-saving measure. However, this was not done because it was not possible to obtain the consent of the parents. The patient rapidly failed and died within 72 hours after the injury. This case is an interesting one from beginning to end; the extensive character of an injury to an extremity, a sudden rise in temperature to 103°, a toxic and delirious patient. The local signs were of the text-book variety—the tense discolored, cold limb, the necrotic jelly-like muscle tissue, a foul smelling seropurulent discharge and crepitus which extended both above and below the immediate site of injury. The treatment is interesting in that it closely follows that which we now understand about the pathogenicity and habits of the causative factors; and may be outlined as follows:

- (1) Prophylactic
- (2) Curative
 - (a) the early case
 - (b) the late case

Although preventive procedures have not been universally adopted, there are those who strongly believe that prophylaxis holds a worth while place in the treatment of this disease. All suspicious injuries should be watched with the thought in mind that one is dealing with a possible gas infection. During the late war, anti-gas gangrene serum was used routinely by the French Medical Service in the care of severe lacerations and compound fractures where there was the remotest possibility of contamination. Davidson, writing in the Georgia Medical Association *Journal on Anaerobic Wound Infection*, states, "that in all severely lacerated wounds and compound fractures, particularly where there is soil contamination, a prophylactic dose of a combined polyvalent anaerobic serum should be given within the first 24 hours." Antitetanic serum should be given if it has not already been administered. Patients who are admitted to a hospital with such potentially dangerous wounds should be placed on a four-hour chart and the dressings used should be such that they may be easily removed for frequent examination of the

injured area. It is generally agreed that serum cannot replace surgery; but its use may make radical surgery unnecessary and also help to lower the mortality.

When an active case of gas infection has already been discovered, the treatment will depend on the probable duration of the disease. As in all other cases in which surgery is indicated the age, sex, social and economic status of the patient may influence the decision of the attending surgeon. All things being equal, if one is fortunate enough to discover the disease in its early hours, the combined use of conservative surgery with serum is the treatment of choice. By conservative surgery is meant the following procedures: free incisions to open the wound as thoroughly as possible, excision of all devitalized tissue, careful removal of all foreign bodies, particularly clothing and blood clots, control of all bleeding points and adequate drainage. These are all important steps in the surgical treatment. The incisions should be numerous and wide enough so that drainage or packing will not be necessary. Wherever it is possible, the muscle bellies should be split by blunt dissection so that bleeding may be minimized. The wound should not be covered with dressings and should be irrigated frequently with oxidizing solutions, for example, hydrogen peroxide or potassium permanganate. The Carrel-Dakin technique, using continuous irrigations with chlorine preparations, has proven its value during the World War. A cradle from which is suspended a drop light may be placed over the affected member.

All these surgical procedures should be supplemented by the early use of adequate doses of a polyvalent gas gangrene antitoxin. The extent of the involved area, the length of time that the injury has existed and the apparent degree of intoxication, all must be taken into consideration in deciding on the dosage of serum to be used.

When it becomes apparent that conservative surgery and serum are unable to check the infection, radical steps should be immediately instituted. If the diagnosis is made late in the disease or if the patient presents symptoms of toxemia, amputation should be considered as the only life-saving measure. The guillotine amputation is the operation of choice; and the site of election should be carefully considered by the attending surgeon, keeping in mind that the infected area is surrounded by falsely

apparent healthy tissue. Following the operation, it is only necessary to control the bleeding points and if one places a cradle and drop lamp over the stump no dressings will be required. The application of oxidizing agents to the stump is of value. The guillotine operation supplemented by serum may save the life of an individual who otherwise might die.

Conclusion: It is the purpose of this report to discuss not only the academic aspect of gas bacillus infection with its symptoms and treatment, but to emphasize upon the active practitioner the acute fulminating character of this disease. Whereas the treatment of the acute surgical abdomen may sometimes be delayed for hours, the care of a wound infected by the bacillus aerogenes capsulatus must be immediate and thorough. It may be interesting to note that the methods of treatment which have already been outlined above were employed in the cases just cited; that Case 1, which was diagnosed late and where amputation was done, lived; that Case 2, which was diagnosed within the first 28 hours and where extensive conservative measures were instituted, died. Finally it may be suggested to those who are prone not to accept the preventive treatment with serum that once an affected case is diagnosed, subsequently suspicious cases should receive prophylactic doses of serum until such time as those who have already been admitted with gas infection have been discharged from the hospital.

From what has gone before, the following inferences may be drawn. In the treatment of this infection, radical surgery including amputation and the liberal use of polyvalent serum are the only dependable measures at hand. In the prevention of this disease the routine use of prophylactic serum should be advocated in all cases of suspicious wounds and in the pre-operative preparation of patients who are to be cared for in rooms situated near those in which gas infected patients have been present.

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THE RHODE ISLAND MEDICAL JOURNAL

Owned and Published by the Rhode Island Medical Society
Issued Monthly under the direction of the Publication Committee, 106 Francis Street

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309 Olney Street, Providence, R. I.

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Reprints will be furnished at the following prices, providing a request for same is made at time proof is returned: 100, 4 pages without covers, \$6.00; each additional 100, \$1.00; 100, 8 pages, without covers, \$7.50; each additional 100, \$2.80; 100, with covers, \$12.00; each additional 100, \$4.80; 100, 16 pages, without covers, \$10.50; each additional 100, \$3.00; 100, with covers, \$16.00; each additional 100, \$5.50.

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Entered at Providence, R. I. Post Office as Second-class Matter.

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EDITORIALS

BASAL ANESTHETIC

The hypnotic drugs, when administered in overdose, will produce a condition of surgical anesthesia, with unconsciousness, muscular relaxation and diminution in reflex excitability, but it has been conclusively shown that this procedure is impracticable as endangering the life of the patient. Large doses of the barbiturates cause a depression of the respiration which may result in serious pulmonary

complications. Tri-brom-ethanol has a similar effect and in addition the theoretical possibility of fatty degeneration of the liver and kidneys, although in some cases of death following the use of this agent the autopsy has shown no demonstrable lesion. In his "Progress of Anesthesia in 1930," Woodbridge stated: "The phrase 'basal anesthesia' used to indicate so deep a state of narcosis produced by preliminary medication that the amount of inhalation anesthetic required to produce surgical anesthesia is greatly reduced and the patient is unaware of its administration, seems to be ill-suited, for the condition is commonly one of moderately deep narco-

sis with or without light anesthesia." Not all American writers are as careful as Woodbridge. German writers have conscientiously avoided the word "anesthetic," as applied to hypnotic agents. In the English abstracts of their papers, the German "narkose" has often been translated "anesthesia." The word "anesthetic," as applied to hypnotic agents, is incorrect. The hypnotics are neither basal nor any other kind of anesthetics. The use of the term "basal anesthetic" is specially dangerous in this country, where the administration of anesthetics is so often entrusted to the ignorant and unskilled. It leads to the impression that administration of an overdose of a hypnotic drug is a safe method of producing surgical anesthesia. In proving the falsity of this idea, the lives of some patients have been sacrificed and others may follow.

HOW TO RECOGNIZE QUALIFIED SPECIALISTS

The recent creation of the Advisory Board of Medical Specialties by the American Medical Association is a broad, comprehensive and commendable step in the sponsorship of the various examining boards for certification in their respective specialties.

There are in existence and already functioning efficiently several of these examining boards, who certify specialists whose qualifications by both investigation and examination reach a high standard of merit. Their pioneer work is of vast importance not only to the profession but to the public whom the physician serves, for it places the seal of approval and qualification upon the real specialist and eliminates the "Mushroom Specialist," the "General Specialist" and the "Specialist by self announcement."

The next issue of the Directory of the American Medical Association will indicate and list as specialists only those who are diplomates of their respective boards, and it is planned to issue shortly a Specialist Directory listing only qualified diplomates.

Already through the proper medical channels the public is being advised of this great undertaking which is to benefit them by accurate information as to who is and who is not a true specialist, and statements as to the significance of examining board certificates.

To quote from a recent editorial in the Journal of the American Medical Association: "As information concerning the work of these boards becomes more widely disseminated among both the medical profession and the public, their prestige must grow. Eventually the young man who wishes to make for himself a place in any of these specialties will consider the securing of a certificate by a council-recognized certifying board as the first step in such a procedure. Hospitals will also do well to be guided in their staff appointments by similar qualifications.

"Movements of this type necessarily develop and advance slowly. However, with the qualifications and restrictions that have been outlined there is reason to believe that the certifying boards will do much to advance the quality of specialistic service available to the people and the profession of our country."

LOOK!

Spring is in the air, in fact, is here and going by, and with it comes the thought of golf. With that thought in mind the Providence Medical Society has voted to hold an Annual Handicap Golf Tournament for its members. Its committee has already been appointed and is at work. The date fixed for the tournament is June 13th and will be held at one of the local clubs. There will be refreshments and a good time will be had by all.

Further announcement of this outing will appear in the daily papers or information can be obtained from Dr. Leone at the Rhode Island Hospital. It is the hope of the committee that a large turnout will take advantage of this opportunity. If this is a success, there is likelihood of a later tournament with the lawyers or some nearby State Medical Society.

A CONSIDERATION OF SOME DISEASES OF THE JAWS*

Osteomyelitis

By CHARLES J. SMITH, D.M.D.

146 WESTMINSTER STREET, PROVIDENCE, R. I.

The dento-alveolar abscess or the so-called abscessed tooth with its associated swelling presents very little difficulty in diagnosis, for the individual so afflicted readily points out the tooth that feels "pushed out of its socket" and most tender to

percussion. The removal of the tooth under such circumstances usually does not establish adequate drainage, for although the tooth was the primary cause the infection has found its way into the bone and through to the periosteum. Often times the periosteum is perforated and it is at such a point drainage should be established by incision.

The removal of a tooth ordinarily, however, is not followed by any alarming symptoms or disturbances in the general condition of the patient. There are times even, when the individual expresses surprise that he did not have more or less pain. And, on the other hand, there are those who cannot understand why there should be any disturbance whatsoever resulting from the extraction of a tooth.

This should be considered. When a tooth is removed there remains an open wound to a depth of one-half inch or more into the bone, soft tissue attachments have been lacerated and the wound is immediately contaminated by the saliva. Dependent upon the virulence of the germs present and the resistance of the tissues determines the reactions experienced. There also enters into the picture the difficulty of the operation and the traumatizing of the tissues.

The type of anaesthetic used in the removal of teeth in all probability has little to do with the post-operative tissue reactions. Some have been led to believe that disturbing tissue reactions are more frequent after the use of the local anaesthetic, novocaine, than when a general anaesthetic is used. It is granted there is more criticism heard as regards the reaction following the local anaesthetic in comparison to the general anaesthetic, but the number of injections made of the local anaesthetic is sufficient evidence as to why such criticism is heard. In Rhode Island, with a registration of about 415 dentists, a fair estimate would be that daily in the State 1,500 injections of novocaine are made and 150 administrations of nitrous-oxide and oxygen given.

The removal of any tooth may result in an osteomyelitis.

This condition rarely becomes alarming in the upper jaw, but results in considerable destruction in the lower jaw. The reason in all probability for this difference is due to the difference in the struc-

ture of the two bones. In the upper jaw we find for the most part cancellous bone which is easily penetrated by infection and reaching an outer surface, readily drains. In the mandible, however, we have a very dense bone with thick cortical plates which offer resistance to quick drainage. It is the confinement of a suppurative inflammation within this slowly yielding structure that results in the radiating and excruciating pain complained of by the individual, and an extensive destruction of bone. There is a sudden chill and a varying temperature from sub-normal to 103°. The pain is deep-seated and there is marked tenderness over the affected area, much swelling occurs and trismus develops because of the involvement of the muscles of mastication. At the onset the X-ray picture will be negative and it is only when destroyed areas occur in the bone that a definite diagnosis of osteomyelitis may be made. In the early stages we can only suspect an osteomyelitis.

The frequent use of the roentgenogram will guide us in the course of the disease. As soon as there is definite congestion or pus formation, adequate drainage should be established. This acute type of osteomyelitis of the mandible very frequently follows the removal of a tooth during the acute stage of infection.

An extensive osteomyelitis may be the cause of a pathological fracture, and the operator, therefore, should carefully check the progress of the infection by the use of roentgenograms.

A pathological fracture may not be averted, but it most surely should be anticipated. A splint should be designed and inserted in such a way so that the parts may be held in their normal positions. A pathological fracture of the mandible, unless splinted, will result in a greater destruction of tissue. As in osteomyelitis in other bones of the body, when sequestra form they should be removed.

There is another type of osteomyelitis to which I would draw your attention and that is one described by Garré as sclerosing osteomyelitis. In this type there is high fever, much pain, involvement of the soft tissues, and not associated with pus formation in a majority of cases. Under palliative treatment, rest and a bone forming diet, the infiltration of the soft tissues subsides, fever falls, recovery gradually occurs and there remains but a thickening of the bone. Garré came to the conclusion that in this type of osteomyelitis sequestration takes place but gradually is absorbed.

*Read before the Providence Medical Association, April 2d, 1934. Lantern slides of radiographs, drawings and sketches were shown to demonstrate operative measures and procedures.

Blair's analysis of 39 cases of osteomyelitis reports 33 associated with peridental infection and of the 33, 31 were operated during an acute stage.

Infection spreads very rapidly by means of the mandibular canal which may be a reason for the occurrence of the disease more diffuse in the mandible than in the maxilla.

Many cases develop from ten days to two weeks after an extraction usually when there has been considerable trauma. Trauma is the fuse that lights up an infection. The extraction of a troublesome tooth in close proximity to a devitalized tooth may result in the flaring up of a latent infection about that tooth.

Sequestral formation may be very minute or sliver-like or may be quite extensive involving a considerable part of the bone.

Cysts and Tumors

The most prevalently found cyst in the bones of the jaws are the radicular or root cyst and the dentigerous cyst. These cysts are being found more frequently now because of the universal use of the X-ray for dental diagnostic purposes. Because, in their earlier stages they give rise to no pain or discomfort and therefore in the past, that is before X-ray, they were not found until there was a pronounced swelling and disturbances of contour.

Cysts and tumors of the jaw may arise at the site of an old peridental inflammation. These and many other forms of chronic irritation acting in conjunction with an inherent predisposition of the tissue toward neoplastic growth constitute the important etiologic factors in the great majority of cases. It does seem that heredity plays a role in the incidence of these growths for the clinical experience is that with some individuals prolonged irritation of identical clinical character does not result in the development of tumors.

The dental cyst radiographically appears as an evenly circumscribed area in the body of the bone, radiolucent to the X-rays and showing a white periphery which upon operation proves to be a thin formation of dense bone. The cavity itself is filled either with a clear amber fluid or pus. One or more teeth may be involved. The cystic lining must be entirely removed at operation for the tendency to recurrence is great. After the removal, the question then arises what to do with the cavity.

In the upper jaw where the cavity extends distally and separated from the Antrum of Highmore

only by the lining of the sinus or a thin wall of bone the cystic cavity and the sinus cavity may be made one cavity, a fairly large window made in the nasal-antral wall for drainage and the oral incision tightly sutured.

When the cystic cavity runs straight back from an anterior tooth underneath the floor of the nose, the nasal cavity and the cystic cavity are made one and the oral opening immediately sutured.

In the lower jaw the entire buccal plate in the region of the cystic cavity is removed down to the lower border of the mandible, the wound immediately sutured and then a constant pressure bandage applied to keep the buccal mucoperiosteal flap in contact with the inner surface of the lingual wall of the mandible.

The removal of the cystic membrane is not as a rule a very difficult operative procedure but a very important part of the operation. Our greatest concern is the elimination of the cavity. Its immediate elimination is most desirous for the large spaces filling up with a blood clot very easily become infected and a slow tedious series of irrigations and treatments result.

It is an accepted theory that the benign giant cell tumors of the long bones is closely associated with the resorption of bone or calcified cartilage. There is a relationship to osteogenesis via cartilage.

The records of the surgical pathological laboratory at Johns Hopkins Hospital covering a period of 35 years show only twenty two cases of giant cell tumor of bone occurring in the head. Two of these were in the temporal fossa, 6 in the upper jaw and 14 in the lower.

Analyzing these records we find that not a single giant cell tumor was found in either the frontal or parietal bones, thus coinciding the theory that tumors of this type are found only in precartilaginous bones. The maxilla like the frontal and parietal bones is a membranous formed bone, but the mandible in certain parts has cartilaginous areas of ossification, namely, at the symphysis where Meckel's cartilage participates in bone formation and also the coronoid and condyloid processes with extension downward in the ramus. So we do occasionally find the giant cell tumor in the mandible.

Most generally the cyst of dental origin can readily be diagnosed from the X-ray picture because of its evenly and definitely circumscribed area and the appearance also of a definite membranous lining. The area is evenly radiolucent. The multilocular

cyst or cystic adamantinoma however, shows an irregular bony circumference and a grouping of smaller cysts in one part of another.

The solid adamantinoma also shows an irregular bony circumference from which arise bony projections extending towards the center and differentiating it from the single dental cyst.

There are numerous growths occurring in the mouth which although may not be truly classified as neoplastic are really hypertrophies of both the hard and soft tissues. There are the bony growths in the median line of the palate varying in size from that of a small pea to that of an English walnut or larger. These are benign growths giving rise to no pain or discomfort until the time comes when plates are to be made. Very often it is necessary to remove these growths in whole or in part.

The continued use of an artificial denture which has become loose or ill fitting gives rise to the development of extensive soft tissue hypertrophies. These hypertrophies may progress steadily and at times assume considerable dimensions. Certain areas become ulcerated and there is possibility of malignancy. Kazanjian of Boston has devised a technique for operation on these particular hypertrophies which leaves the mouth in exceptionally good condition for new and well stabilized plates. Other common growths are the epulides:—the fibrous epulis, and the giant cell epulis. They occur more frequently during the early years and are somewhat more common among women than men.

Certain local causes may be recognized, such as, persistent peridental irritation and infection ragged edges of carious teeth, irritating bands and roots. These growths are usually situated between teeth and from which position they protrude as small pedunculated masses which progressively enlarge.

Epulides are fairly common and grow more rapidly during pregnancy.

The giant cell epulis is more common than the true fibroma. It is usually soft and is of a deep red or purple color and bleeds easily. They are evidently of periosteal origin.

Metastatic tumors of the jaw are rare. Carcinomata may have their origin in the breast or some remote part of the body and the jaw may be involved in connection with a general carcinomatosis. Primary carcinoma of the jaw, however, have been reported.

Whereas, the exostoses, soft tissue hypertrophies cysts of the jaws occur in mouths of good or poor sanitary conditions, it is significant that cancerous lesions are found most generally where conditions are mostly insanitary.

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LINGUAL THYROID*

By LEWIS B. PORTER, M.D.

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The incidence of lingual thyroid places it among the rare anomalies of development and has great interest attached to it because of the large proportion of cases in which it is the sole source of thyroid tissue.

Cattel and Hoover,¹ reported for the Lahey Clinic in 1929, met with it in two cases in 7,600 thyroid operations. Grace & Weeks² collected only 130 cases in the literature. Ulrich³ found two cases in 4,000 cases of thyroid diseases at the University of Pennsylvania. Dore⁴ analyzes 81 cases of lingual thyroid and found myxoedema followed in seven after removal of the lingual thyroid, a ratio of 1-11. It is more common in women; a ratio of 8-1 has been found. A few cases have been found in the new-born.

About the fourth week of embryonic life there is seen in the 2½ mm. fetus evidence of the thyroid gland, first noticed as a median anlage in the floor of the pharynx. It is a diverticulum or pouch of entodermal cells which soon becomes solid and descends until the pretracheal region is reached. During its progress downward the lingual attachment is maintained so that a stalk or duct is formed, and later becomes atrophied. This is the thyroglossal duct and is in later life a source of cysts and fistulas. The upper end of the duct is marked by the foramen caecum seen as a depression at the end of the median raphe of the tongue. The progress of the thyroid downward may be arrested so that anomalous positions are formed at any point, the least frequent being the lingual. Lahey has made a classification in relation to their embryological development as follows: (1) those that remain and

*Read before the Ophthalmological and Otological Society at the Peters House, Rhode Island Hospital, at the December meeting, 1933.

develop at the point of fetal origin, the foramen caecum, and are clinically known as lingual goiters; those that develop and remain localized in the structure of the tongue, called intralingual goiters; those developing in front of the larynx, the pre-laryngeal type; those that develop and assume the normal position anterior and lateral to the upper rings of the trachea, known as pretracheal; and those that develop in the superior mediastinum behind the sternum, commonly called retrosternal.

A theory has been advanced that the thyroid tissue sometimes arises from the post-bronchial bodies, or fifth pouches uniting with the lateral thyroid bodies, and better explains the origin of accessory thyroids and lateral ectopia; they often undergo malignancy. Though microscopically they look like thyroid tissue, they have not proven sufficient activity to present myxoedema after removal of the thyroid. The para thyroids develop from the third and fourth pharyngeal pouches on each side and are, therefore, not subject to malposition as the thyroid. The lingual thyroid is an adult gland undescended.

Symptoms

Although lingual thyroid has been found at birth, symptoms are not usually discovered until puberty and even much later, at thirty-five approximately in the case I wish to report. Its presence may not have been known for years. The symptoms may be very insidious, becoming more troublesome as goiter develops. They are those of any benign growth at the base of the tongue, difficulty in swallowing and phonation.

The gland is seen with the tongue protruded or with a laryngeal mirror at the base of the tongue at the foramen caecum lying in the sulcus in front of the epiglottis. It is firm, usually smooth, covered with mucous membrane with large veins coarsing through it; occasionally it is irregular in outline, more often it is not. There is usually a broad base, though I have read of one pedunculated. The mucosa is somewhat deeper red than the surrounding membrane.

When a tentative diagnosis is made, an effort should be made to determine the presence of other thyroid tissue. The isthmus and lateral lobes in the normal location are not always palpable, so one may be forced to operate with some uncertainty as to whether he is dealing with a true ectopia or an

accessory thyroid. An exploratory incision in the normal site has been recommended to determine the presence of thyroid tissue, which involves very little risk. This to me seems hardly necessary, for if the removal of the lingual growth is imperative one should be prepared to combat myxoedema. With a suture through the tip of the tongue and lateral lingual sutures anterior to the growth, a good working field is obtained. Anesthesia by tubes through the nose and to the trachea is best. Large gauze pads are then placed in the oro-pharynx. An incision of the mucous membrane at the base of the tumor is elevated, and a blunt dissection is done. Deep sutures and ligation control bleeding. The encapsulated growth is shelled out much as a tonsil. Ever so much more of the gland is found in the tongue than on its surface.

The case I wish to report is a woman of forty, unmarried, of French parentage, menstruated at fifteen years. She is four feet eight inches in height, and weighs somewhat less than one hundred pounds. For several years, six or seven, she has had food lodge in the throat which she would have to wash down with water or regurgitate. This condition has become more aggravated recently. Her voice has become somewhat nasal in quality and has had some severe hemorrhages from the throat during the past year. There has never been any pain.

About September 1933 she had a peritonsillar infection. In this examination her family physician discovered a large lingual growth. I found it to be attached at the foramen caecum hemispherical and symmetrical in shape, three by two by one and one-half cm. at the base, with large veins in the mucosa. No pretracheal thyroid could be palpated, all tracheal rings could be counted. A portion of the growth felt less firm, so I inserted a needle and withdrew a thick, reddish yellow fluid, suggesting cystic degeneration.

Inasmuch as she was getting along tolerably well, it seemed prudent not to interfere with it at present as deglutition and respiration are not too troublesome.

REFERENCES

1. Cattell & Hoover: *Surgical Clinics N. A.*, 1929, Vol. IX.
2. Grace & Weeks: *Annals of Surgery*, 1932.
3. Ulrich: *Annals of Surgery*, 1932, Vol. 95.
4. Dore, F. R.: *Bordeaux Thesis*, 1922.

REPORT OF THE MILK COMMISSION OF THE PROVIDENCE MEDICAL ASSOCIATION

REUBEN C. BATES, M.D., *Secretary*

Certified Milk in Providence during 1933 was obtained from the following farms: Cocumcussoc Farm, Wickford, R. I.; Cherry Hill Farm, North Beverly, Mass.; Fair Oaks Farm, Lincoln, R. I.; Hampshire Hills Farm, Wilton, N. H.; Walker-Gordon Farm, Charles River, Mass.

Through the courtesy and co-operation of the Boston Commission we have accepted their certification of two farms from Massachusetts and one from New Hampshire.

Bacteriological and chemical examinations of the milk are made in the laboratories of Brown University under the supervision of Prof. Charles Stuart. Monthly visits are made to the local farms, and Dr. Harris Moak of New York has inspected these farms twice during the year.

A co-operative campaign has been carried out in an effort to acquaint the medical and dental profession concerning Vitamin-D Milk. This consisted of a series of letters and pamphlets which has been sent to all members of the Association and to the dentists in the vicinity. Full page advertisements have been inserted in the R. I. MEDICAL JOURNAL during the year.

Monthly Averages of Certified Milk

	COCUMCUSSOC			CHERRY HILL			FAIROAKS			HAMPSHIRE HILLS (Past.)			WALKER-GORDON		
	B.F.	T.S.	Bacteria per C.C.	B.F.	T.S.	Bacteria per C.C.	B.F.	T.S.	Bacteria per C.C.	B.F.	T.S.	Bacteria per C.C.	B.F.	T.S.	Bacteria per C.C.
Jan.	4.82	14.16	2,581	4.82	14.32	1,350	4.72	14.06	3,050	.....	.....	.....	4.12	13.01	2,222
Feb.	4.40	13.63	3,306	4.72	14.16	1,900	4.55	13.97	2,477	3.95	12.95	.....	4.17	12.98	2,150
March	4.35	13.52	2,605	4.70	14.07	2,400	4.57	14.48	2,022	4.42	12.89	50	4.10	12.93	1,587
April	4.60	13.79	2,175	4.45	13.74	650	4.97	14.23	2,518	3.85	12.80	50	4.10	12.88	3,312
May	4.72	13.99	2,300	4.22	13.41	887	4.80	14.19	2,856	3.87	18.81	.....	4.05	12.88	1,650
June	5.58	13.66	2,583	4.14	13.45	810	4.54	13.87	2,658	3.94	12.95	883	3.98	12.78	2,490
July	4.50	13.85	3,433	4.30	13.72	1,355	4.40	13.63	5,383	3.92	13.27	1,442	4.14	13.00	5,250
August	4.35	13.90	3,457	4.25	13.50	1,398	4.28	13.41	2,157	3.90	12.60	10	4.05	13.01	6,800
Sept.	4.56	13.80	4,611	4.32	13.57	1,275	4.57	13.71	2,372	3.88	12.78	.....	4.10	12.65	3,986
Oct.	4.56	14.34	3,062	4.40	13.47	2,412	4.46	13.53	2,666	4.07	12.91	.....	4.02	12.66	4,425
Nov.	4.39	13.46	14,466	4.34	13.32	2,060	4.33	13.82	1,805	4.17	13.18	.....	4.08	12.83	4,580
Dec.	4.26	13.26	28,790	4.40	13.34	2,566	4.38	13.58	2,766	4.21	13.19	200	4.15	12.89	4,200
Yearly Aver.	4.59	13.78	6,114	4.42	13.67	1,588	4.54	13.87	3,561	4.02	13.48	221	4.08	12.87	3,554

Averages (all farms) for the year: B. Fat—4.33; T. Solids—13.53; Bacteria—3,007

The personnel of the Commission includes Drs. William P. Buffum, A. Roland Newsam, Harold G. Calder, Harmon P. B. Jordan and Reuben C. Bates, Secretary and Treasurer.

SOCIETIES

PAWTUCKET DISTRICT SOCIETY

April 19, 1934.

The annual meeting and banquet of the Pawtucket Medical Association was held at the Biltmore Hotel, Providence, R. I., on March 15, 1934.

The following officers were elected for the year 1934-35: President, Dr. H. J. Hanly; Vice-President, Dr. W. Dufresne; Secretary, Dr. Thad. A. Krollicki; Treasurer, Dr. B. U. Richards; Councillor, Dr. Chas. Hold; Delegates—Dr. E. Mathewson, Dr. S. Sprague, Dr. C. L. Farrell; Library Committee—Dr. E. Mathewson, Dr. G. Howe, Dr. B. Marshall.

Respectfully submitted,

THAD. A. KROLICKI, M.D.,
Secretary

BOOK REVIEWS

THE HISTORY AND EPIDEMIOLOGY OF SYPHILIS,

William Allen Pusey, A.M., M.D., LL.D.

Charles C. Thomas, publisher. Price, \$2.00.

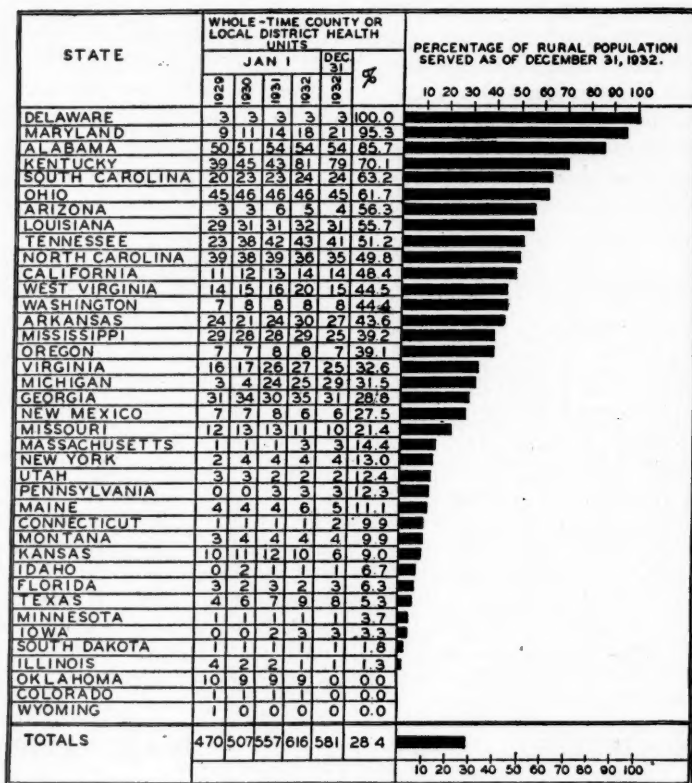
The first and second chapters deal with the history of syphilis and the development of our knowledge of the disease. The last chapter is a discussion of the epidemiology of syphilis.

The book is interesting, particularly the lectures on the history of syphilis and on its epidemiology. It also contains pictures of many men who played an important part in the development of our knowledge of the disease, such as Hutchinson, Schaudinn, Wasserman and others.

COUNTY HEALTH UNITS

By MALFORD W. THEWLIS, M.D.,

WAKEFIELD, R. I.



A careful glance at the accompanying chart, taken from *Public Health Reports*, will reveal states which have full-time county or local district health units.

Of the 581 counties, townships or districts, 551 or 94.8 per cent were receiving financial assistance for the support of their health service from one or more of the following agencies: the State Board of Health, the United States Public Health Service, the Rockefeller Foundation, the American Red Cross, the American Women's Hospital Fund, the Rosenwald Fund, the Commonwealth Fund and the Millbank Fund.

71.6 per cent of our rural population is as yet not provided with the form of health organization which is best adapted for rural areas.

Delaware has a hundred per cent rating, as will be seen from the chart; Massachusetts, 14.4%; Maryland, 95%. Rhode Island has a zero rating. The only other states having zero ratings are Colorado, Indiana, Nebraska, Nevada, New Hampshire, New Jersey, Oklahoma, Wisconsin and Wyoming.

Rhode Island has a rural population of about 62,000. There is great need for a county health unit as operated in other states.